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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/557,694	11/22/2005	Hideo Hada	SHIGA.033APC	7849
20995 7590 04/26/2007 KNOBBE MARTENS OLSON & BEAR LLP 2040 MAIN STREET FOURTEENTH FLOOR IRVINE, CA 92614			EXAMINER EOFF, ANCA	
			ART UNIT 1709	PAPER NUMBER
SHORTENED STATUTORY PERIOD OF RESPONSE		NOTIFICATION DATE	DELIVERY MODE	
3 MONTHS		04/26/2007	ELECTRONIC	

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Notice of this Office communication was sent electronically on the above-indicated "Notification Date" and has a shortened statutory period for reply of 3 MONTHS from 04/26/2007.

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## Office Action Summary

### Application No.

10/557,694

### Applicant(s)

HADA ET AL.

### Examiner

Anca Eoff

### Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 11/22/2005, 01/25/2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-15 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date 11/22/2005.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_.



## DETAILED ACTION

### *Claim Status*

1. Claims 1- 17 are pending in the application.

### *Claim Rejections - 35 USC § 102*

2. The following is a quotation of the appropriate paragraph of 35 U.S.C. 102 that forms the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-7, 11-13, 16 and 17 are rejected under 35 U.S.C. 102(b) as being anticipated by Przybilla et al. (SPIE, Volume 1672 Advances in Resist Technology and Processing IX, 1992).

With regard to claims 1-3, Przybilla et al. disclose a resin for photoresist composition having a – C(CF<sub>3</sub>)<sub>2</sub>OH group incorporated in aromatic monomers and polymers (par. 2 on page 501 and table 3 on page 506).

This group meets the limitations of claims 1-3, because the hydroxyl group –OH is bonded to a carbon atom at polymer terminals, wherein the carbon atom has in α-position to said hydroxyl group two electron attractive groups –CF<sub>3</sub> (trifluoromethyl).

With regard to claim 4, Przybilla et al. further disclose that the resins require 30-40 mol % of 2- HHFIP (2-hydroxyhexafluoroisopropyl group) in the polymer to deliver the appropriate alkaline solubility (par. 2.1 on page 501).



With regard to claim 5 and 6, Przybilla et al. disclose a resin for photoresist composition having a  $-\text{C}(\text{CF}_3)_2\text{OH}$  group incorporated in aromatic monomers and polymers (par. 2 on page 501 and table 3 on page 506).

The  $-\text{C}(\text{CF}_3)_2\text{OH}$  group meets the limitations of claim 5, having the same structure as the preferred  $-\text{CR}_1\text{R}_2\text{OH}$  group disclosed on page 20 of the instant application, where  $\text{R}_1$ ,  $\text{R}_2$  can be independently an alkyl group, a halogen atom, a halogenated alkyl group and at least one of  $\text{R}_1$  and  $\text{R}_2$  is an electron attractive group selected from the group consisting of halogen atoms and halogenated alkyl groups.

In this case,  $\text{R}_1$ ,  $\text{R}_2 = -\text{CF}_3$  (trifluoromethyl).

Absent a record to prove the contrary, the  $-\text{C}(\text{CF}_3)_2\text{OH}$  group has a  $\text{pK}_a$  value within a range from 6 to 12 (MPEP 2112.01 II ).

The  $-\text{C}(\text{CF}_3)_2\text{OH}$  group meets the limitations of claim 6, with  $\text{R}_1$ ,  $\text{R}_2 = -\text{CF}_3$  (trifluoromethyl), an electron attracting group.

With regard to claim 7, Przybilla et al. further disclose that the 2-HHIP (2-hydroxyhexafluoroisopropyl) group can be esterified with di-tertbutyl dicarbonate exactly as a phenolic group, creating a functional group deprotection (t-BOC) type photoresist. The use of a 50% protected homopolymer results in a resist material with high contrast and high density (par.2.2 and 2.3 on pages 502, 503).

With regard to claims 11-13, Przybilla et al. further disclose a dissolution inhibition type photoresist material containing modified styrene with 40 mol % HHIP (2-hydroxyhexafluoroisopropyl) moieties, 2,2-bis (4-(2-tert-butyloxycarbonyloxy-hexafluoroisopropyl)-styrene and triphenylsulfonium triflate as acid generator (par.2.3



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on pages 502 and 503). The triflate (trifluoromethane sulfonate,  $\text{CF}_3\text{-SO}_3^-$ ) anion meets the limitations of claim 13.

The modified styrene with 40 mol % HHIP (2-hydroxy-hexafluoroisopropyl) moieties meets the limitations of claim 1, since the hydroxyl group  $\text{-OH}$  is bonded to a carbon atom at polymer terminals, wherein the carbon atom has in  $\alpha$ -position to said hydroxyl group two electron attractive group  $\text{-CF}_3$  (trifluoromethyl) (chemical formula of HHIP modified styrene appears in table on page 506).

With regard to claim 16, Przybilla et al. further disclose that the photoresist may comprise nitrogen-containing organic compounds, such as hexamethoxymethylmelamine as a crosslinker (par.2.4 on page 503).

With regard to claim 17, Przybilla et al. further disclose a process of forming a line & space resist pattern using a photoresist comprising poly (4-(2-tertbutyloxy-carbonyloxy-hexafluoroisopropyl)styrene-co-4-(2-hydroxyhexafluoroisopropyl)styrene). The process comprises a pre-bake step, exposure step, post-exposure bake and development (picture 1 on page 510).

4. Claims 1-3, 5-13, 16 and 17 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Pawlowski et al. (US 6,358,665).

With regard to claims 1-3 and 5-6, Pawlowski et al. disclose a radiation sensitive composition containing a homopolymer or copolymers of a hydroxystyrene resin with other monomers.



Pawlowsky et al. clearly disclose preferred monomers usable herein including 3-(2-hydroxy-hexafluoropropyl-2) styrene and 4-(2-hydroxy-hexafluoropropyl-2)-styrene (column 13, line 30-column 14, line 3).

In the alternative, it would have been obvious to select 3-(2-hydroxy-hexafluoropropyl-2) styrene and 4-(2-hydroxy-hexafluoropropyl-2)-styrene as co-monomers for the hydroxyl-styrene based resin, as being clearly disclosed by Pawlowski et al. (column 13, line 30-column 14, line 3).

The substituents in the 3-(2-hydroxy-hexafluoropropyl-2) styrene and 4-(2-hydroxy-hexafluoropropyl-2)-styrene meet the limitations of claims 1-3, because the hydroxyl group  $-OH$  is bonded to a carbon atom at polymer terminals, wherein the carbon atom has in a-position to said hydroxyl group two electron attractive groups  $-CF_3$  (trifluoromethyl).

The 2-hydroxy-hexafluoropropyl group meets the limitations of claim 5, having the same structure as the preferred  $-CR_1R_2OH$  group disclosed on page 20 of the instant application, where  $R_1$ ,  $R_2$  can be independently an alkyl group, a halogen atom, a halogenated alkyl group and at least one of  $R_1$  and  $R_2$  is an electron attractive group selected from the group consisting of halogen atoms and halogenated alkyl groups.

In this case,  $R_1$ ,  $R_2 = -CF_3$  (trifluoromethyl).

Absent a record to prove the contrary, the  $-C(CF_3)_2OH$  group has a  $pK_a$  value within a range from 6 to 12 (MPEP 2112.01 II ).

The 2-hydroxy-hexafluoropropyl-2 group meets the limitations of claim 6, with  $R_1$ ,  $R_2 = -CF_3$  (trifluoromethyl), an electron attracting group.



With regard to claim 7, Pawlowski et al. further disclose that the hydroxystyrene-based resin is made alkali-soluble by protecting alkali-soluble groups on the resin with an acid cleavable protecting group (acid dissociable, dissolution inhibiting group) and disclose a variety of protective groups that could protect the phenolic hydroxyl groups and the carboxyl groups in the copolymer (column 14, lines 4-41).

With regard to claim 8, Pawlowski et al. clearly teach that the hydroxystyrene copolymers can also comprise as other monomer (meth)acrylic acid and its derivatives (such as methyl acrylate or methyl methacrylate) (column 13, lines 30-50).

In the alternative, it would have been obvious to select (meth)acrylic acid and its derivatives (such as methyl acrylate or methyl methacrylate) as co-monomers for the hydroxyl-styrene based resin, as being clearly disclosed by Pawlowski et al. (column 13, line 30-50).

Examples of hydroxystyrene based resins suitable for VDUV (193 nm) applications include co- or terpolymers of (meth)acrylates with acid-cleavable protective groups (column 14, lines 51-54).

One specific example shows that 2-methyl-2-adamantyl methacrylate (2-methyl-2-adamantyl is a protective group, in accordance to column 14, lines 25-39) and mevalonic lactone methacrylate are used as co-monomers in the hydroxystyrene-based resin (column 45, lines 28-29).

With regard to claim 9, Pawlowski et al. clearly teach that other preferred monomers are poly-(4-hydroxyphenyl) (meth)acrylate, poly-(3-



hydroxyphenyl)(meth)acrylate, poly (2-hydroxyphenyl) (meth)acrylate (column 13, lines 59-63).

In the alternative, it would have been obvious to select are poly-(4-hydroxyphenyl) (meth)acrylate, poly-(3-hydroxyphenyl)(meth)acrylate, poly (2-hydroxyphenyl) (meth)acrylate as co-monomers for the hydroxyl-styrene based resin, as being clearly disclosed by Pawlowski et al. (column 13, line 59-63).

With regard to claim 10, Pawlowski et al. further disclose that the resin have molecular weights in the range 2,000 to 20,000 (column 16, lines 27-28), with particular examples where the styrene-based resin has molecular weights under 12,000 (column 65).

With regard to claim 11, Pawlowski et al. further disclose chemically amplified radiation sensitive compositions comprising the hydroxystyrene-based resins (abstract).

The resins comprise a homopolymers or copolymers of a hydroxystyrene resin with other monomers.

Pawlowski clearly teaches that two of the preferred monomers usable herein include 3-(2-hydroxy-hexafluoropropyl-2) styrene and 4-(2-hydroxy-hexafluoropropyl-2)-styrene (column 13, line 30-column 14, line 3).

In the alternative, it would have been obvious to select 3-(2-hydroxy-hexafluoropropyl-2) styrene and 4-(2-hydroxy-hexafluoropropyl-2)-styrene as co-monomers for the hydroxyl-styrene based resin, as being clearly disclosed by Pawlowski et al. (column 13, line 30-column 14, line 3).



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With regard to claims 12 and 13, Pawlowski et al. further disclose that the chemically amplified radiation sensitive composition comprises an acid generator, which is an onium salt (abstract).

The onium salt has the formula  $Y^+ ASO_3^-$ , where A represents  $CF_3-CHF-CF_2-$  or  $CF_3-CF_2-CF_2-CF_2-$  (fluorinated alkyl groups) (abstract),

These fluoroalkylsulfonate anions meet the limitations of claim 13.

With respect to claim 16, Pawlowski et al. further disclose that the chemically amplified radiation sensitive composition comprises nitrogen-containing compounds, such as urea and melamine derivatives as crosslinking agents (column 17, lines 46-48).

With respect to claim 17, Pawlowski et al. further disclose that the chemically amplified radiation sensitive composition is used as a photoresist in applications where the composition is coated on various substrates, and the coated substrates are exposed to render latent images alkali soluble or alkali insoluble, followed by rinsing with an alkali to form predetermined patterns on the substrates (column 19, line 65-column 20, line 4).

### ***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.



6. Claims 14 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pawlowski et al. (US Patent 6,358,665) as applied to claim 12 and further in view of Lamanna et al. (US Patent 5,554,664).

Pawlowski et al. disclose chemically amplified radiation sensitive compositions comprising the hydroxystyrene-based resins and an acid generator, which is an onium salt (abstract), as applied to claim 12.

The resins comprise a homopolymers or copolymers of a hydroxystyrene resin with other monomers.

Pawlowski clearly teaches that two of the preferred monomers usable herein include 3-(2-hydroxy-hexafluoropropyl-2) styrene and 4-(2-hydroxy-hexafluoropropyl-2)-styrene (column 13, line 30-column 14, line 3).

Pawlowski et al. disclose that the acid generator is an onium salt and has the formula  $Y^+ ASO_3^-$ , where A represents  $CF_3-CHF-CF_2-$  or  $CF_3-CF_2-CF_2-CF_2-$  (fluorinated alkyl groups) (abstract) and can be used in combination with other photoacid generators, such as anionic sulfonium salts (column 12, line 18). However, Pawlowski et al. fail to teach the use of sulfonium salts of bis sulfonyl imide as acid generators.

Lamanna et al. disclose the use of bis(highly fluorinated alkyl)sulfonylimide as energy-sensitive (e.g.thermal, radiation or photosensitive) initiator. These compounds have improved solubility in organic solvents, exhibit minimal corrosiveness when coating and adhesives are prepared using the compounds, generate highly reactive initiator, curative and/or catalyst upon activation by energy (abstract).



Lamanna et al. disclose that the cationic portion of the catalysts and initiators includes organic onium cations such as triarylsulfonium, wherein "aryl" is defined as an unsubstituted or substituted aromatic moiety having up to four independently selected substituents (column 5, lines 46- 51). The anionic portion includes fluorinated (highly fluorinated and perfluorinated) bisalkyl or aryl-sulfonylimide (column 6, lines 63-67).

Specific examples of anions are:  $(C_2F_5SO_2)_2N^-$ ,  $(C_4F_9SO_2)_2N^-$ ,  $(CF_3SO_2)_2N^-$ ,  $(CF_3SO_2)(C_4F_9SO_2)N^-$  (column 7, lines 45-49).

The compounds disclosed by Lamanna correspond to the acid generator (b2) of claim 14 of the instant application, where Y,Z are fluorinated methyl, ethyl or butyl groups and  $R_1$ ,  $R_2$ ,  $R_3$  are aryl groups.

It would have been obvious for one of ordinary skill in the art at the time of the invention to use one of the of bis(highly fluorinated alkyl)sulfonylimide initiators of Lamanna et al. in the chemically amplified radiation sensitive compositions disclosed by Pawlowski et al., in order to take advantage of the properties of the initiator (good solubility in organic solvents, minimal corrosiveness when coating and adhesives are prepared using the compounds, generate highly reactive initiator upon activation by energy (Lamanna - abstract).

### **Conclusion**

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.



Kawasato et al. (US Pg-Pub 2003/0049456) disclose an optical film comprising an antireflective film (C), which is made of a polymer having a the formula:  
$$X-CF_2-((OCFR_1CF_2)_p-(OCF_2CF_2)_q-(OCF_2)_r)_m-CF_2X$$
, where X can be a hydroxyl group (par.0057 and par.0058). In this polymer, the hydroxyl group is bonded to a carbon atom at a polymer terminal, wherein the carbon atom has two fluorine atoms in  $\alpha$ -position to said hydroxyl group.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anca Eoff whose telephone number is 571-272-9810. The examiner can normally be reached on Monday-Friday, 6:30 AM-4:00 PM, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on 571-272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



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AE

*AE*

*Barbara Gilliam*

**BARBARA GILLIAM  
PRIMARY EXAMINER**